CLAIMS

What is claimed is:

1. An apparatus for analyzing at least one individual gas component in a multi-component gas mixture, comprising:

   (a) an array of at least two chemo/electro-active materials connected in parallel circuitry, each chemo/electro-active material exhibiting a different electrical response characteristic upon exposure to the individual gas component than each other chemo/electro-active material;

   (b) means for determining an electrical response of each chemo/electro-active material upon exposure of the array to the gas mixture;

   (c) means for determining a value for the temperature of the array connected in parallel circuitry with the chemo/elctro-active materials; and

   (d) means for digitizing the electrical responses and the temperature value, and calculating a value from the digitized electrical responses and temperature value, to perform an analysis of the individual gas component.

2. An apparatus according to Claim 1 wherein the array is situated within the gas mixture, which has a temperature of about 400°C or more.

3. An apparatus according to Claim 1 wherein the gas mixture is an emission from a combustion process.

4. An apparatus according to Claim 1 wherein the component gases in the gas mixture are not separated.

5. An apparatus according to Claim 1 wherein the temperature of each chemo/electro-active material is determined substantially only by the variable temperature of the gas mixture.

6. An apparatus according to Claim 1 wherein the analysis is performed from the electrical responses of the chemo/electro-active materials upon exposure to the multi-component gas mixture only.

7. An apparatus according to Claim 1 wherein the means for performing analysis is means for calculating the concentration within the gas mixture of the individual gas component.

8. An apparatus according to Claim 1 wherein at least one chemo/electro-active material, when at a temperature of about 400°C or more, (i) has an electrical resistivity in the range of about 1 ohm-cm to about 10^5 ohm-cm, and (ii) exhibits a change in electrical resistance of at least about 0.1 percent upon exposure of the material to an individual gas component, as compared to the resistance before exposure.

9. An apparatus according to Claim 1 wherein the electrical response characteristic of each material upon exposure to the gas mixture at a selected temperature is quantifiable as a value, and the response value of at least one material is constant or varies by no more than about twenty percent during exposure of the material to an individual gas component at the selected temperature for a period of at least about one minute.

10. An apparatus according to Claim 1 wherein the electrical response is selected from the group consisting of resistance, impedance, capacitance, voltage or current.

11. An apparatus according to Claim 1 wherein at least one chemo/electro-active material is a metal oxide.

12. In a multi-component gas mixture having a temperature of about 400°C or more, an apparatus for calculating the concentration of at least two individual analyte gas components in the mixture, comprising:

(a) an array of at least three chemo/electro-active materials, the array being situated within the gas mixture, and each chemo/electro-active material having a different electrical response characteristic upon exposure to each of the individual analyte gas components than each of the other chemo/electro-active materials;

(b) means for determining an electrical response of each chemo/electro-active material upon exposure of the array to the unseparated components of the gas mixture; and

(c) means for calculating the concentration of each of the individual analyte gas components from the electrical responses of the chemo/electro-active materials upon exposure to the multi-component gas mixture only.

13. An apparatus according to Claim 12 wherein the gas mixture is an emission from a combustion process.

14. An apparatus according to Claim 12 wherein the temperature of each chemo/electro-active material is determined substantially only by the variable temperature of the gas mixture.

15. An apparatus according to Claim 12 wherein at least one chemo/electro-active material, when at a temperature of about 400°C or more, (i) has an electrical resistivity in the range of about 1 ohm-cm to about 10^5 ohm-cm, and (ii) exhibits a change in electrical resistance of at least about 0.1 percent upon exposure of the material to an analyte gas component, as compared to the resistance before exposure

16. An apparatus according to Claim 12 wherein the electrical response characteristic of each material upon exposure to the gas mixture at a selected

temperature is quantifiable as a value, and the response value of at least one material is constant or varies by no more than about twenty percent during exposure of the material to an analyte gas component at the selected temperature for a period of at least about one minute.

17. An apparatus according to Claim 12 wherein the electrical response is selected from the group consisting of resistance, impedance, capacitance, voltage or current.

18. An apparatus according to Claim 12 wherein at least one chemo/electro-active material is a metal oxide.

19. In a multi-component gas mixture having a temperature of about 400°C or more, an apparatus for calculating the concentration of at least two individual analyte gas components in the mixture, comprising:

(a) an array of at least three chemo/electro-active materials connected in parallel circuitry, the array being situated within the gas mixture, and each chemo/electro-active material exhibiting a change in electrical resistance upon exposure to each of the individual analyte gas components, wherein at least one chemo/electro-active material, when at a temperature of about 400°C or more, (i) has an electrical resistivity in the range of about 1 ohm-cm to about 10^5 ohm-cm, and (ii) exhibits a change in electrical resistance of at least about 0.1 percent upon exposure of the material to an analyte gas component, as compared to the resistance before exposure;

(b) means for determining the change in resistance of each chemo/electro-active

material upon exposure of the array to the gas mixture; and

(c) means for calculating the concentration of each of the individual analyte gas components from the changes in resistance of the chemo/electro-active materials.

20. An apparatus according to Claim 19 wherein the gas mixture is an emission from a combustion process.

21. An apparatus according to Claim 19 wherein the temperature of each chemo/electro-active material is determined substantially only by the variable temperature of the gas mixture.

22. An apparatus according to Claim 19 wherein the electrical response characteristic of each material upon exposure to the gas mixture at a selected temperature is quantifiable as a value, and the response value of at least one material is constant or varies by no more than about twenty percent during exposure of the material to an analyte gas component at the selected temperature for a period of at least about one minute.

23. An apparatus according to Claim 19 wherein at least one chemo/electro-active material is a metal oxide.

24. An apparatus for analyzing at least one individual gas component in a multi-component gas mixture, comprising:

(a) an array of at least two chemo/electro-active materials, each chemo/electro-active material having a different electrical response characteristic upon exposure at a selected temperature to the individual gas component than each of the other chemo/electro-active materials, the electrical response characteristic of each material being quantifiable as a value, wherein the response value of at least one material is constant or varies by no more

than about twenty percent during exposure of the material to an individual gas component at the selected temperature for a period of at least about one minute;

(b) means for determining the electrical response value of each chemo/electro-active material upon exposure of the array to the gas mixture; and

(c) means for performing an analysis of the individual gas component from the electrical response values.

25. An apparatus according to Claim 24 wherein the array is situated within the gas mixture, which has a temperature of about 400°C or more.

26. An apparatus according to Claim 24 wherein the gas mixture is an emission from a combustion process.

27. An apparatus according to Claim 24 wherein the means for performing analysis is means for calculating the concentration within the gas mixture of the individual gas component.

28. An apparatus according to Claim 24 wherein the temperature of each chemo/electro-active material is determined substantially only by the variable temperature of the gas mixture.

29. An apparatus according to Claim 24 wherein the electrical response is selected from the group consisting of resistance, impedance, capacitance, voltage or current.

30. An apparatus according to Claim 24 wherein at least one chemo/electro-active material is a metal oxide.

31. In a multi-component gas mixture having a temperature of less than about 400°C, an apparatus for analyzing at least one individual gas component in the mixture, comprising:

(a) an array of at least two chemo/electro-active materials, each chemo/electro-active material having a different

electrical response characteristic upon exposure at a selected temperature to the individual gas component than each of the other chemo/electro-active materials, the array being situated within the gas mixture, and having a substantially constant temperature of about 400C or more;

(b) means for determining the electrical response value of each chemo/electro-active material upon exposure of the array to the gas mixture; and

(c) means for performing an analysis of the individual gas component from the electrical response values.

32. An apparatus according to Claim 31 wherein the component gases in the gas mixture are not separated.

33. An apparatus according to Claim 31 wherein the analysis is performed from the electrical responses of the chemo/electro-active materials upon exposure to the multi-component gas mixture only.

34. An apparatus according to Claim 31 wherein the means for performing analysis is means for calculating the concentration within the gas mixture of the individual gas component.

35. An apparatus according to Claim 31 further comprising means for determining a value for the temperature of the gas mixture connected in parallel circuitry with the chemo/elctro-active materials, and wherein the individual gas component is analyzed from digitized electrical responses and a digitized temperature value.

36. An apparatus according to Claim 31 wherein at least one chemo/electro-active material, when at a temperature of about 400°C or more, (i) has an electrical resistivity in the range of about 1 ohm-cm to about 10^5 ohm-cm, and (ii) exhibits a change in electrical resistance of at least about 0.1 percent

upon exposure of the material to an individual gas component, as compared to the resistance before exposure.

37. An apparatus according to Claim 31 wherein the electrical response characteristic of each material upon exposure to the gas mixture at a selected temperature is quantifiable as a value, and the response value of at least one material is constant or varies by no more than about twenty percent during exposure of the material to an individual gas component at the selected temperature for a period of at least about one minute.

38. An apparatus according to Claim 31 wherein the electrical response is selected from the group consisting of resistance, impedance, capacitance, voltage or current.

39. An apparatus according to Claim 31 wherein at least one chemo/electro-active material is a metal oxide.

40. An apparatus for analyzing at least one individual gas component in a multi-component gas mixture, comprising:

(a) an array of first and second chemo/electro-active materials, each chemo/electro-active material having a different electrical response characteristic upon exposure at a selected temperature to the individual gas component than each of the other chemo/electro-active materials, wherein the chemo/electro-active materials are selected from the pairings in the group consisting of

(i) the first material is M^1O_x, and the second material is $M^1_aM^2_bO_x$;

(ii) the first material is M^1O_x, and the second material is $M^1_aM^2_bM^3_cO_x$;

(iii) the first material is $M^1{}_aM^2{}_bO_x$, and the second material is $M^1{}_aM^2{}_bM^3{}_cO_x$;

(iv) the first material is a first M^1O_x, and the second material is a second M^1O_x;

(v) the first material is a first $M^1{}_aM^2{}_bO_x$, and the second material is a second $M^1{}_aM^2{}_bO_x$; and

(vi) the first material is a first $M^1{}_aM^2{}_bM^3{}_cO_x$, and the second material is a second $M^1{}_aM^2{}_bM^3{}_cO_x$;

wherein M^1 is selected from the group consisting of Ce, Co, Cu, Fe, Ga, Nb, Ni, Pr, Ru, Sn, Ti, Tm, W, Yb, Zn, and Zr; M^2 and M^3 are each independently selected from the group consisting of Al, Ba, Bi, Ca, Cd, Ce, Co, Cr, Cu, Fe, Ga, Ge, In, K, La, Mg, Mn, Mo, Na, Nb, Ni, Pb, Pr, Rb, Ru, Sb, Sc, Si, Sn, Sr, Ta, Ti, Tm, V, W, Y, Yb, Zn, and Zr, but M^2 and M^3 are not the same in $M^1{}_aM^2{}_bM^3{}_cO_x$; a, b and c are each independently about 0.0005 to about 1, provided that a+b+c = 1; and x is a number sufficient so that the oxygen present balances the charges of the other elements in the compound;

(b) means for determining the electrical response of each chemo/electro-active material upon exposure of the array to the gas mixture; and

(c) means for performing an analysis of the individual gas component from the electrical responses.

41. An apparatus according to Claim 40 wherein

(a) M^1O_x is selected from the group consisting of Ce_aO_x, CoO_x, CuO_x, FeO_x, GaO_x, NbO_x, NiO_x, PrO_x, RuO_x, SnO_x, Ta_aO_x, TiO_x, TmO_x, WO_x, YbO_x, ZnO_x, ZrO_x , SnO_x with Ag additive, ZnO_x with Ag additive, TiO_x with Pt additive, ZnO_x with frit additive, NiO_x with frit additive, SnO_x with frit additive, or WO_x with frit additive;

(b) $M^1{}_aM^2{}_bO_x$ is selected from the group consisting of $Al_aCr_bO_x$, $Al_aFe_bO_x$, $Al_aMg_bO_x$, $Al_aNi_bO_x$, $Al_aTi_bO_x$, $Al_aV_bO_x$, $Ba_aCu_bO_x$, $Ba_aSn_bO_x$, $Ba_aZn_bO_x$, $Bi_aRu_bO_x$, $Bi_aSn_bO_x$, $Bi_aZn_bO_x$, $Ca_aSn_bO_x$, $Ca_aZn_bO_x$, $Cd_aSn_bO_x$, $Cd_aZn_bO_x$, $Ce_aFe_bO_x$, $Ce_aNb_bO_x$, $Ce_aTi_bO_x$, $Ce_aV_bO_x$, $Co_aCu_bO_x$, $Co_aGe_bO_x$, $Co_aLa_bO_x$, $Co_aMg_bO_x$, $Co_aNb_bO_x$, $Co_aPb_bO_x$, $Co_aSn_bO_x$, $Co_aV_bO_x$, $Co_aW_bO_x$, $Co_aZn_bO_x$, $Cr_aCu_bO_x$, $Cr_aLa_bO_x$, $Cr_aMn_bO_x$, $Cr_aNi_bO_x$, $Cr_aSi_bO_x$, $Cr_aTi_bO_x$, $Cr_aY_bO_x$, $Cr_aZn_bO_x$, $Cu_aFe_bO_x$, $Cu_aGa_bO_x$, $Cu_aLa_bO_x$, $Cu_aNa_bO_x$, $Cu_aNi_bO_x$, $Cu_aPb_bO_x$, $Cu_aSn_bO_x$, $Cu_aSr_bO_x$, $Cu_aTi_bO_x$, $Cu_aZn_bO_x$, $Cu_aZr_bO_x$, $Fe_aGa_bO_x$, $Fe_aLa_bO_x$, $Fe_aMo_bO_x$, $Fe_aNb_bO_x$, $Fe_aNi_bO_x$, $Fe_aSn_bO_x$, $Fe_aTi_bO_x$, $Fe_aW_bO_x$, $Fe_aZn_bO_x$, $Fe_aZr_bO_x$, $Ga_aLa_bO_x$, $Ga_aSn_bO_x$, $Ge_aNb_bO_x$, $Ge_aTi_bO_x$, $In_aSn_bO_x$, $K_aNb_bO_x$, $Mn_aNb_bO_x$, $Mn_aSn_bO_x$, $Mn_aTi_bO_x$, $Mn_aY_bO_x$, $Mn_aZn_bO_x$, $Mo_aPb_bO_x$, $Mo_aRb_bO_x$, $Mo_aSn_bO_x$, $Mo_aTi_bO_x$, $Mo_aZn_bO_x$, $Nb_aNi_bO_x$, $Nb_aNi_bO_x$, $Nb_aSr_bO_x$, $Nb_aTi_bO_x$, $Nb_aW_bO_x$, $Nb_aZr_bO_x$, $Ni_aSi_bO_x$, $Ni_aSn_bO_x$, $Ni_aY_bO_x$, $Ni_aZn_bO_x$, $Ni_aZr_bO_x$, $Pb_aSn_bO_x$, $Pb_aZn_bO_x$, $Rb_aW_bO_x$, $Ru_aSn_bO_x$, $Ru_aW_bO_x$, $Ru_aZn_bO_x$, $Sb_aSn_bO_x$, $Sb_aZn_bO_x$, $Sc_aZr_bO_x$, $Si_aSn_bO_x$, $Si_aTi_bO_x$, $Si_aW_bO_x$, $Si_aZn_bO_x$, $Sn_aTa_bO_x$, $Sn_aTi_bO_x$, $Sn_aW_bO_x$, $Sn_aZn_bO_x$, $Sn_aZr_bO_x$, $Sr_aTi_bO_x$, $Ta_aTi_bO_x$, $Ta_aZn_bO_x$, $Ta_aZr_bO_x$, $Ti_aV_bO_x$, $Ti_aW_bO_x$, $Ti_aZn_bO_x$, $Ti_aZr_bO_x$, $V_aZn_bO_x$, $V_aZr_bO_x$, $W_aZn_bO_x$, $W_aZr_bO_x$, $Y_aZr_bO_x$, $Zn_aZr_bO_x$, $Al_aNi_bO_x$ with frit additive, $Cr_aTi_bO_x$ with frit additive, $Fe_aNi_bO_x$ with frit additive, $Fe_aTi_bO_x$ with frit additive, $Nb_aTi_bO_x$ with frit additive, $Nb_aW_bO_x$ with frit additive, $Ni_aZn_bO_x$ with frit additive, $Ni_aZr_bO_x$ with frit additive, or $Ta_aTi_bO_x$ with frit additive; and/or

(c) $M^1{}_aM^2{}_bM^3{}_cO_x$ is selected from the group consisting of $Al_aMg_bZn_cO_x$, $Al_aSi_bV_cO_x$, $Ba_aCu_bTi_cO_x$, $Ca_aCe_bZr_cO_x$, $Co_aNi_bTi_cO_x$,

$Co_aNi_bZr_cO_x$, $Co_aPb_bSn_cO_x$, $Co_aPb_bZn_cO_x$, $Cr_aSr_bTi_cO_x$, $Cu_aFe_bMn_cO_x$, $Cu_aLa_bSr_cO_x$, $Fe_aNb_bTi_cO_x$, $Fe_aPb_bZn_cO_x$, $Fe_aSr_bTi_cO_x$, $Fe_aTa_bTi_cO_x$, $Fe_aW_bZr_cO_x$, $Ga_aTi_bZn_cO_x$, $La_aMn_bNa_cO_x$, $La_aMn_bSr_cO_x$, $Mn_aSr_bTi_cO_x$, $Mo_aPb_bZn_cO_x$, $Nb_aSr_bTi_cO_x$, $Nb_aSr_bW_cO_x$, $Nb_aTi_bZn_cO_x$, $Ni_aSr_bTi_cO_x$, $Sn_aW_bZn_cO_x$, $Sr_aTi_bV_cO_x$, $Sr_aTi_bZn_cO_x$, or $Ti_aW_bZr_cO_x$.

42. An apparatus according to Claim 40 wherein the array is situated within the gas mixture, which has a temperature of about 400°C or more.

43. An apparatus according to Claim 40 wherein the gas mixture is an emission from a combustion process.

44. An apparatus according to Claim 40 wherein the component gases in the gas mixture are not separated.

45. An apparatus according to Claim 40 wherein the analysis is performed from the electrical responses of the chemo/electro-active materials upon exposure to the multi-component gas mixture only.

46. An apparatus according to Claim 40 wherein the means for performing analysis is means for calculating the concentration within the gas mixture of the individual gas component.

47. An apparatus according to Claim 40 further comprising means for determining a value for the temperature of the gas mixture connected in parallel circuitry with the chemo/elctro-active materials, and wherein the individual gas component is analyzed from digitized electrical responses and a digitized temperature value.

48. An apparatus according to Claim 40 wherein the temperature of each chemo/electro-active material is determined substantially only by the variable temperature of the gas mixture.

49. An apparatus according to Claim 40 wherein at least one chemo/electro-active material, when at a temperature of about 400°C or more, (i) has an electrical resistivity in the range of about 1 ohm-cm

to about 10^5 ohm-cm, and (ii) exhibits a change in electrical resistance of at least about 0.1 percent upon exposure of the material to an individual gas component, as compared to the resistance before exposure.

50. An apparatus according to Claim 40 wherein the electrical response characteristic of each material upon exposure to the gas mixture at a selected temperature is quantifiable as a value, and the response value of at least one material is constant or varies by no more than about twenty percent during exposure of the material to an individual gas component at the selected temperature for a period of at least about one minute.

51. An apparatus according to Claim 40 wherein the electrical response is selected from the group consisting of resistance, impedance, capacitance, voltage or current.

52. An apparatus for analyzing at least one individual gas component in a multi-component gas mixture, comprising:

(a) an array of at least two chemo/electro-active materials connected in parallel circuitry, each chemo/electro-active material having a different electrical response characteristic upon exposure at a selected temperature to the individual gas component than each of the other chemo/electro-active materials, the electrical response characteristic of each material being quantifiable as a value, wherein the response value of at least one material is constant or varies by no more than about twenty percent during exposure of the material to an individual gas component at the selected temperature for a period of at least about one minute;

(b) means for determining the electrical response value of each chemo/electro-active material upon exposure of the array to the gas mixture;

(c) means for determining a value for the temperature of the gas mixture connected in parallel with the chemo/elctro-active materials; and

(d) means for digitizing the electrical responses and the temperature value, and calculating a value from the digitized electrical response and temperature value, to perform an analysis of the individual gas component.

53. An apparatus according to Claim 52 wherein the array is situated within the gas mixture, which has a temperature of about 400°C or more.

54. An apparatus according to Claim 52 wherein the gas mixture is an emission from a combustion process.

55. An apparatus according to Claim 52 wherein the component gases in the gas mixture are not separated.

56. An apparatus according to Claim 52 wherein the temperature of each chemo/electro-active material is determined substantially only by the variable temperature of the gas mixture.

57. An apparatus according to Claim 52 wherein the analysis is performed from the electrical responses of the chemo/electro-active materials upon exposure to the multi-component gas mixture only.

58. An apparatus according to Claim 52 wherein the means for performing analysis is means for calculating the concentration within the gas mixture of the individual gas component.

59. An apparatus according to Claim 52 wherein at least one chemo/electro-active material, when at a temperature of about 400°C or more, (i) has an electrical resistivity in the range of about 1 ohm-cm to about 10^5 ohm-cm, and (ii) exhibits a change in

electrical resistance of at least about 0.1 percent upon exposure of the material to an individual gas component, as compared to the resistance before exposure.

60. An apparatus according to Claim 52 wherein the electrical response is selected from the group consisting of resistance, impedance, capacitance, voltage or current.

61. An apparatus according to Claim 52 wherein the array is situated within the gas mixture, which has a temperature of less than about 400°C, and the array has a substantially constant temperature of about 400°C or more.

62. An apparatus according to Claim 52 wherein at least one chemo/electro-active material is a metal oxide.

63. In a multi-component gas mixture having a temperature of about 400°C or more, an apparatus for calculating the concentration of at least two individual analyte gas components in the mixture, comprising:

(a) an array of at least three chemo/electro-active materials connected in parallel circuitry, the array being situated within the gas mixture, and each chemo/electro-active material exhibiting a change in electrical resistance upon exposure to each of the individual analyte gas components, wherein at least one chemo/electro-active material, when at a temperature of about 400C or more, (i) has an electrical resistivity in the range of about 1 ohm-cm to about 10^5 ohm-cm, and (ii) exhibits a change in electrical resistance of at least about 0.1 percent upon exposure of the material to an analyte gas component, as compared to the resistance before exposure;

(b) means for determining the change in resistance of each chemo/electro-active material upon exposure of the array to the unseparated components of the gas mixture; and

(c) means for calculating the concentration of each of the individual analyte gas components from the changes in resistance of the chemo/electro-active materials upon exposure to the multi-component gas mixture only.

64. An apparatus according to Claim 63 wherein the gas mixture is an emission from a combustion process.

65. An apparatus according to Claim 63 further comprising means for determining a value for the temperature of the gas mixture connected in parallel circuitry with the chemo/elctro-active materials, and wherein the individual gas component is analyzed from digitized electrical responses and a digitized temperature value.

66. An apparatus according to Claim 63 wherein the temperature of each chemo/electro-active material is determined substantially only by the variable temperature of the gas mixture.

67. An apparatus according to Claim 63 wherein the electrical response characteristic of each material upon exposure to the gas mixture at a selected temperature is quantifiable as a value, and the response value of at least one material is constant or varies by no more than about twenty percent during exposure of the material to an analyte gas component at the selected temperature for a period of at least about one minute.

68. An apparatus according to Claim 63 wherein at least one chemo/electro-active material is a metal oxide.

69. A method for analyzing at least one individual gas component in a multi-component gas mixture, comprising:

(a) providing an array of at least two chemo/electro-active materials connected in parallel circuitry, each chemo/electro-active material exhibiting a different electrical response characteristic upon exposure to the individual gas component than each other chemo/electro-active material;

(b) exposing the array to the gas mixture ;

(c) determining an electrical response of each chemo/electro-active material upon exposure of the array to the gas mixture;

(d) determining a value for the temperature of the gas mixture independently of the determination of the electrical responses of the chemo/elctro-active materials; and

(e) digitizing the electrical responses and the temperature value, and calculating a value from the digitized electrical responses and temperature value to perform an analysis of the individual gas component.

70. A method according to Claim 69 wherein the array is situated within the gas mixture, which has a temperature of about 400°C or more.

71. A method according to Claim 69 wherein the gas mixture is an emission from a combustion process.

72. A method according to Claim 69 wherein the component gases in the gas mixture are not separated.

73. A method according to Claim 69 wherein the temperature of each chemo/electro-active material is determined substantially only by the variable temperature of the gas mixture.

74. A method according to Claim 69 wherein the analysis is performed from the electrical responses of

the chemo/electro-active materials upon exposure to the multi-component gas mixture only.

75. A method according to Claim 69 wherein the analysis performed comprises calculating the concentration within the gas mixture of the individual gas component.

76. A method according to Claim 69 wherein at least one chemo/electro-active material, when at a temperature of about 400°C or more, (i) has an electrical resistivity in the range of about 1 ohm-cm to about 10^5 ohm-cm, and (ii) exhibits a change in electrical resistance of at least about 0.1 percent upon exposure of the material to an individual gas component, as compared to the resistance before exposure.

77. A method according to Claim 69 wherein the electrical response characteristic of each material upon exposure to the gas mixture at a selected temperature is quantifiable as a value, and the response value of at least one material is constant or varies by no more than about twenty percent during exposure of the material to an individual gas component at the selected temperature for a period of at least about one minute.

78. A method according to Claim 69 wherein the electrical response is selected from the group consisting of resistance, impedance, capacitance, voltage or current.

79. A method according to Claim 69 wherein the array is situated in the gas mixture, which has a temperature of less than about 400°C, and the array has a substantially constant temperature of about 400C or more.

80. A method according to Claim 69 wherein at least one chemo/electro-active material is a metal oxide.

81. A method for calculating the concentration of at least two individual analyte gas components in a

multi-component gas mixture having a temperature of about 400°C or more, comprising:

(a) providing within the gas mixture an array of at least three chemo/electro-active materials, each chemo/electro-active material having a different electrical response characteristic upon exposure to each of the individual analyte gas components than each of the other chemo/electro-active materials, wherein at least one chemo/electro-active material, when at a temperature of about 400°C or more, (i) has an electrical resistivity in the range of about 1 ohm-cm to about 10^5 ohm-cm, and (ii) exhibits a change in electrical resistance of at least about 0.1 percent upon exposure of the material to an analyte gas component, as compared to the resistance before exposure;

(b) determining an electrical response of each chemo/electro-active material upon exposure of the array to the unseparated components of the gas mixture; and

(c) calculating the concentration of each of the individual analyte gas components from the electrical responses of the chemo/electro-active materials upon exposure to the multi-component gas mixture only.

82. A method according to Claim 81 wherein the gas mixture is an emission from a combustion process.

83. A method according to Claim 81 wherein the temperature of each chemo/electro-active material is determined substantially only by the variable temperature of the gas mixture.

84. A method according to Claim 81 wherein the electrical response characteristic of each material upon exposure to the gas mixture at a selected

temperature is quantifiable as a value, and the response value of at least one material is constant or varies by no more than about twenty percent during exposure of the material to an analyte gas component at the selected temperature for a period of at least about one minute.

85. A method according to Claim 81 wherein the electrical response is selected from the group consisting of resistance, impedance, capacitance, voltage or current.

86. A method according to Claim 81 wherein at least one chemo/electro-active material is a metal oxide.

87. A method for analyzing at least one individual gas component in a multi-component gas mixture, comprising:

(a) providing an array of at least two chemo/electro-active materials, each chemo/electro-active material having a different electrical response characteristic upon exposure at a selected temperature to the individual gas component than each of the other chemo/electro-active materials, the electrical response characteristic of each material being quantifiable as a value, wherein the response value of at least one material is constant or varies by no more than about twenty percent during exposure of the material to an individual gas component at the selected temperature for a period of at least about one minute;

(b) determining the electrical response value of each chemo/electro-active material upon exposure of the array to the gas mixture; and

(c) performing an analysis of the individual gas component from the electrical response values.

88. A method according to Claim 87 wherein the array is situated within the gas mixture, which has a temperature of about 400°C or more.

89. A method according to Claim 87 wherein the gas mixture is an emission from a combustion process.

90. A method according to Claim 87 wherein the analysis performed comprises calculating the concentration within the gas mixture of the individual gas component.

91. A method according to Claim 87 wherein the temperature of each chemo/electro-active material is determined substantially only by the variable temperature of the gas mixture.

92. A method according to Claim 87 wherein the electrical response is selected from the group consisting of resistance, impedance, capacitance, voltage or current.

93. A method according to Claim 87 wherein at least one chemo/electro-active material is a metal oxide.

94. A method according to Claim 87 wherein the array is situated in the gas mixture, which has a temperature of less than about 400°C, and the array has a substantially constant temperature of about 400°C or more.